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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,703	03/24/2004	H. Daniel Dulman	MI22-2514	6063

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EXAMINER	
MOHAMEDULLA, SALEHA R	
ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/808,703	DULMAN ET AL.
	Examiner	Art Unit
	Saleha R. Mohamedulla	1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *66-71* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *66-71* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *03242004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claims 66-71 are pending.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 66-71 are rejected under 35 U.S.C. 102(b) as being anticipated by US# 5,725,973 to Han et al.

Han teaches a photomask for transferring a pattern onto a semiconductor wafer. The mask comprises a transparent substrate, an opaque mask pattern formed on the substrate, for defining an optical transmission area between the edges of the opaque mask pattern, by selectively blocking light, and an optical transmittance control film pattern for suppressing a proximity effect in part of the optical transmission area (col. 4, line 63 – col. 5, line 3). The optical transmittance control film pattern is one selected from the group consisting of spin-on-glass, photoresist, silicon oxide, aluminum, silicon nitride, polysilicon, titanium, titanium nitride, chromium and tungsten (col. 5, lines 4-8). Han teaches that the optical transmittance control film is not resolved on the photoresist material (col. 4, lines 32-34). Figures 6, 9 and 12 show the mask. Figure 6 shows the opaque mask pattern 11 with an optical transmittance control film 10 formed in an intersection area between portions of the opaque mask pattern (col. 7, lines 30-40). Han also teaches that the optical transmission rate for the optical control film is 50% (col. 7,

lines 25-27). The structure, i.e., the opaque mask pattern, defines a radiation intensity and the subresolution assist feature comprises a material that is partially transmissive, as the transmission of the control film is 50%. Also, the assist feature is used to correct optical proximity effect. Han also teaches that the first material of the structure is different than the second material of the assist feature, as Han teaches that the first material can be chromium (col. 9, lines 39-41) and that the second material has 50% transmittance and can be spin-on-glass, photoresist, silicon oxide, aluminum, silicon nitride, polysilicon, titanium, titanium nitride, chromium or tungsten (col. 5, lines 4-8).

3. Claims 66-71 are rejected under 35 U.S.C. 102(b) as being anticipated by US# 5,563,009 to Bae.

Bae teaches a photomask having two chrome patterns 13, a phase shift pattern 14, and auxiliary patterns 15 formed on both sides of the phase shift pattern 14 on a quartz substrate 12, as shown in Figure 2 (col. 2, lines 33-38). The auxiliary patterns 15 are formed on both sides of the phase shift pattern 14 to have as low light intensity distribution as possible (col. 2, lines 44-46). The sum of the width of the phase shift pattern 14 and the widths of the auxiliary patterns 15 formed on both sides of the phase shift pattern 14 is the same as the line width of each of the chrome patterns 13. The phase shift pattern 14 is formed of spin on glass(SOG), and the auxiliary pattern 15 is formed with semitransparent material(for example, chrome having a light penetration rate of 10%) or a material which can completely shield the light (col. 2, lines 52-56). Bae also teaches that the exposure method of using the mask, that is, the reiteration exposure method makes it possible to form a micropattern greater than the resolution

limit of the stepper (col. 3, lines 15-20). Figure 3 shows the light intensity distribution of light which penetrates the photomask (col. 3, lines 9-11). A structure on the mask is the phase shifting pattern 14. Auxiliary patterns 15 are assist features proximate the structure of the phase shifting pattern 14. The phase shifting pattern defines a pattern of radiation intensity as shown in Figure 3. The assist features 15 are semitransparent. As shown in Figure 3, the assist features 15 alter the pattern of radiation intensity relative to a pattern of radiation intensity that would be defined by the phase shifting structure in the absence of the assist features 15. That is, without the assist features, the spikes in the intensity graph of Figure 3 would not exist. Also, Bae teaches that the assist feature are transmissive of from about 5% to 20% of light as Bae teaches that the semitransparent material may have a light penetration of 10%. Bae also teaches that the structure is made of a first material, spin on glass, which is different from the material of the assist feature, thin chrome (col. 2, lines 52-56).

Bae teaches that the auxiliary patterns 15 are sub-resolution because Bae teaches that they are formed to have as low light intensity distribution as possible (col. 2, lines 44-46) and that the total width of the pattern 14 with the patterns 15 is the same as the width of a chrome pattern 13 (col. 2, lines 48-52).

4. Claims 66-71 are rejected under 35 U.S.C. 102(b) as being anticipated by US# 4,902,899 to Lin et al.

Lin teaches a photolithographic process employing a mask that contains subresolution half-tones. Half-tone materials have partially transmitting light characteristics. The half-tone regions permit partial compensation for image degradation, therefore they are assist features.

The half-tone regions are formed from attenuating arrays of opaque or transparent sub-resolution elements (col. 1, lines 50-65 and col. 2, lines 50-65). Lin also teaches separate black portions (1) on the mask that represent opaque features. These features are above the resolution of light (col. 3, lines 8-10). Therefore, Lin teaches a mask with opaque portions and half-tone subresolution portions. The opaque material is different from the materials used in the half-tone features. Also, Lin teaches that a phase shift does not occur in the mask, therefore, the change in phase passing through the different portions and thicknesses of the mask is 0 or 360 degrees. Therefore, Lin teaches the limitations of the claims.

5. Claims 66-71 are rejected under 35 U.S.C. 102(b) as being anticipated by US# 5,827,625 to Lucas et al.

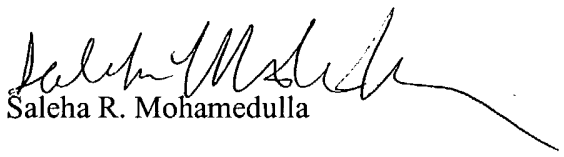
Lucas teaches a method of forming a reticle with attenuating features. Figures 3 and 5 illustrate the reticle having subresolution outriggers and features. The features are the structures on the mask. Figure 5 illustrates the reticle being used in an exposure process of patterning light to imprint features on a semiconductor wafer. Attenuating features 30 are of a substantially uniform width (col. 2, lines 50-55). The attenuating features may be opaque to radiation used to expose a photoresist layer, for example, they may be made of chromium. The attenuating features also may include portions that allow radiation to pass through the reticle (col. 2, lines 25-35). Outriggers 32 are subresolution features that do not substantially pattern the resist layer on a wafer (col. 2, lines 40-45). Outriggers are used to improve the resolution of main features, and are therefore, assist features (col. 1, lines 40-42). The reticle has a substrate which may be made of fused silica or glass (col. 4, lines 10-15).

Conclusion

6. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Saleha Mohamedulla whose telephone number is (571) 272-1387. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Saleha R. Mohamedulla

Patent Examiner

Technology Center 1700

August 23, 2004